SECTION 02582
MILWAUKEE DOUBLE HARP AND LANTERN LIGHTING POLES

PART 1 – GENERAL

1.1 SUMMARY

A. General: Furnish Milwaukee Double Harp and Lantern Lighting Poles in accordance with the requirements of the Contract Documents.

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO): "Standard Specifications of Structural Supports for Highway Signs, Luminaires and Traffic Signals".

B. American Institute of Steel Construction (AISC): "Manual of Steel Construction, Allowable Stress Design".

C. American Welding Society (AWS): D1.1, "Structural Welding Code, Steel".

D. Underwriters Laboratories, Inc. (UL): UL 57, "Electric Lighting Fixtures".

1.3 SYSTEM DESCRIPTION

A. Performance Requirements:

1. Anchorage: Provide lighting pole base with slotted holes for anchor bolts to suit a deviation of 0.25" in the bolt diameter and circle pattern indicated on Drawings.

2. Wind Resistance: The entire horizontal and vertical "wind sail" area of the pole assembly subject to wind load, including cast metal attachments. Luminaires, banner arms (incorporating banners), baskets, traffic signals, holiday decorations and signage shall be designed to withstand the AASHTO Standard Specifications, Section 2 requirements for wind load of 80 mph with a 30% gust factor from Table 1.2.5C and height factor from Table 1.2.5B for various individual wind sail areas.

3. Additional Horizontal Loading: The Lantern Light Pole assembly, anchor plates, and bolts shall be designed to withstand a horizontal load of 1,000 pounds taken at the topmost point of the pole. Poles shall be designed to withstand all AASHTO Standard Specifications requirements for this loading, including deflection criteria.

1.4 SUBMITTALS

A. Procedures: Furnish submittals in accordance with general requirements specified in Section 01330, SUBMITTAL PROCEDURES.

B. Shop Drawings: Furnish shop drawings for the fabrication and installation of the Work. Prepare layouts in plan at not less than 1" = 1'–0". Prepare details at not less than 6" = 1'–0" minimum scale. Show typical details of the conditions for every member,

joint, anchorage and support in the system including luminaire mounting assembly details. Shop drawings shall be furnished by the Successful Bidder within 30 days of the bid award.

1. **Coordinated Submittals:** Furnish submittals of component parts and prepare coordination details and erection diagrams for lighting pole assemblies. Show in the submittals that lighting pole assemblies have received prior approval of the manufacturer or fabricator of each principal component.

C. **Samples:** Label samples to indicate product, characteristics, and locations in the Work. Samples will be reviewed for color and appearance only. Compliance with all other requirements is the exclusive responsibility of the Contractor. Samples are not returnable nor included in quantities required for the Work. Samples may be reviewed at manufacturer's facilities, in lieu of shipping to the City of Milwaukee, provided that manufacturer gives 2 week prior notice and pays all expenses for 2 persons including 2 days' travel and lodging at the review site. Patterns, molds, and material samples shall be furnished by the Successful Bidder within 18 weeks after shop drawings are approved. Furnish samples of the following.

1. A full scale three dimensional carved wood or molded plaster mock–up of the bases, arms, and bracelets.

2. A 12" high cross–section of the street lighting pole showing fluting detail.

3. Full size banner arm and finial.

D. **Product Data:** Furnish a material list with technical data documenting the primary function, quality, and performance of each system to be used in the Work, e.g., the UL ratings, and other such primary characteristics as required by the Drawings and Specifications.

E. **Supplementary Product Literature:** Furnish manufacturer's literature describing the general properties of each product to be used in the Work.

F. **Structural Calculations:** Furnish engineering calculations for lighting poles to show that maximum stresses and deflections do not exceed specified performance requirements under full design loading. Calculations shall be prepared and sealed by an engineer licensed in the State of Wisconsin.

G. **Quality Control Testing and Inspection Reports:** Furnish reports of Quality Control testing and inspection. Include the following.

1. Vibration test report and procedures in accordance with ANSI Standard C136, 31/1 and in accordance with the testing requirements specified herein.

1.5 QUALITY ASSURANCE

A. **Contractor's Quality Assurance Responsibilities:** Contractor is solely responsible for quality control of the Work. Comply with the requirements specified in Section 01450, QUALITY CONTROL.

B. **Mock–Up:** Provide a factory mock–up of the approved designed components for the street lighting poles with luminaire assembly. Utilize the same materials and installation methods in the mock–up as intended for the final Work. Schedule the mock–up so that it may be examined, and any necessary adjustments made, prior to commencing fabrication of the Work. Replace unsatisfactory items as directed. When accepted, mock–up shall serve as the standard for materials, workmanship, and appearance for such Work throughout the project. One complete assembly mock–up of each pole type shall be furnished by the Successful Bidder within 20 weeks after shop drawings are approved. Adjustments to the mock–up must be made within 10 days after receiving a request for adjustment.

C. **Manufacturer Qualifications:** Each component shall be of current manufacture from a firm regularly engaged in design and manufacturing of such components. Provide only components which can be properly maintained and serviced without requiring long periods of interrupted service because of lack of available parts. Manufacturer shall certify to the Commissioner that the accepted luminaire and pole components are or shall become manufacturer's stock items with replacement parts readily available for a minimum of 10 years.

D. **Interchangeability:** Each light pole component including the handhole doors in the pole and the split pedestal base shall be mutually interchangeable for assembly, so that no work will be required to make any member fit properly in the place of any other similar member of any other similar pole.

E. **Regulatory Requirements:** Comply with applicable requirements of the laws, codes, ordinances and regulations of Federal, State and Municipal authorities having jurisdiction. Obtain necessary approvals from all such authorities.

1.6 WARRANTY

A. **Factory Finish Warranty:** Furnish manufacturer's 5 year written warranty, warranting that the factory applied finishes will not develop excessive fading or excessive nonuniformity of color or shade, and will not crack, peel, pit, corrode, or otherwise fail as a result of defects in materials or workmanship within the following defined limits. Upon notification of such defects, within the warranty period, make necessary repairs or replacement at the convenience of the City.

1. **"Excessive Fading":** A change in appearance which is perceptible and objectionable as determined by the Commissioner when visually compared with the original color range standards.

2. **"Excessive Non–Uniformity":** Non–uniform fading to the extent that adjacent components have a color difference greater than the original acceptable range of color.

3. **"Will Not Pit or Otherwise Corrode":** No pitting or other type of corrosion discernible from a distance of 10', resulting from the natural elements in the atmosphere at the project site.

1.7 MAINTENANCE

A. **Maintenance and Operating Manuals:** Furnish complete manuals describing the materials, devices and procedures to be followed in operating, cleaning and maintaining the Work. Include manufacturers' brochures and parts lists describing the actual materials used in the Work, including major components. Assemble manuals for component parts into single binders identified for each assembly.

B. **Tools:** Furnish a quantity of 10 of each tool required to service and maintain lighting poles, luminaires and bollards.

PART 2 – PRODUCTS

2.1 LIGHTING POLES

A. **Lighting Poles:** Provide tapered and fluted steel shaft pole assemblies, size and configuration as indicated on the Drawings.

1. Provide gasketed handhole in base of pole.

2. Furnish technical data verifying that pole material meets physical and chemical requirements of an ASTM A595, Grade A standard grade structural alloy.

B. **Bases:** Ornamental bases custom fabricated of heavy wall cast iron, ASTM A48, Class 30B, sand casting, fine and tight, free of irregularities, with access door located in the base, door to coincide with the hand hole in the steel pole.

1. The two halves of the split base casting shall be perfectly matched to each other and to the poles so that when they are attached to the mast, the base and mast assembly appear as a single piece unit. No tolerance greater than 0.125" will be acceptable.

2. The split pedestal base attachment to the pole shall provide the structural integrity to ensure the base will not vibrate, twist or bounce during the sidewalk movement experienced when a heavily loaded vehicle passes. Where set screws are used to secure the base to the pole, provide minimum 3/16" thick metal where set screws are inserted to minimize stripping of the treads when set screws are tightened in place. Provide a minimum of three 1/4" x 20 stainless steel N.C. button head Torx T27H tamperproof screws.

3. The split pedestal base shall provide an entry door whose appearance and fit is in consonance with the mast and base design both aesthetically and structurally.

a. Securely fasten the door in place with a sufficient number of 9/16" x 20 Torx flat–head stainless steel screws which thread into a rigid door frame.

b. Doors shall be interchangeable with any other base. Bases whose doors are matched to a single base are not acceptable.

c. Position the door in the base so that the base can be attached to the pole with the base door in perfect alignment with the pole door.

d. The door shall provide ample room for a worker to reach into the base with hand tools, open the pole door, splice wires, change fuses and read the identification tag on the pole.

C. Luminaire Arm:

1. Each arm shall be cast aluminum, ASTM B26/B26M, Grade 319.

2. Castings shall have smooth external surfaces free from protuberances, dents, cracks or other imperfections marring their appearance. Welding or plugging of casting defects is prohibited.

3. Arm shall be straight and true along both the longitudinal and vertical axis so that it provides perfect, parallel vertical mounting for the two luminaires.

4. Arm shall be structurally rigid so that when mounted on a pole, fitted with the capitals and luminaires indicated, and carrying two 4” x 14” banners with each top securely fastened to one side of the pole arm and each bottom securely fastened to the pole, neither an 80 mph AASHTO wind load, the vibration of a heavily loaded vehicle will cause any twisting, racking or bouncing of the arm assembly in either the vertical or horizontal plane.

5. The arm attachment to the pole shall provide the structural integrity to hold the arm firmly in place during the loading and vibration described above. Where set screws are used to secure the arm to the pole, a minimum of 3/16” thickness of metal shall be provided where set screws are inserted to minimize the possibility of stripping the threads when the set screws are tightened into place. Provide a minimum of three 1/4” x 20 stainless steel N.C. button head Torx T27H tamperproof screws.

6. An access point near the top of the arm shall be provided to facilitate wiring from the fixture to the pole handhole. The access point cover shall be in architectural consonance with the arm and shall be securely held in place with a minimum of two 1/4” x 20 stainless steel N.C. button head Torx T27H tamperproof screws in a minimum of 3/16” thickness of metal. Provide a “J” hook at this access point to support luminaire wiring so that rubbing on the interior raceway is minimized.

7. The interior of the arm shall provide a smooth, burr–free raceway for the luminaire wiring.

D. Banner Arms: Custom fabricated of hot dip galvanized steel tube, threaded into steel sleeve, with decorative cast aluminum painted finial, and mounted with Type 201 stainless steel band straps.

E. Bracelets and Finials: Cover bracelets and finials shall be cast aluminum, ASTM B26/B26M, Grade 319. Castings shall have smooth external surfaces free from protuberances, dents, cracks or other imperfections marring their appearance. Welding or plugging of casting defects is prohibited.

F. Planter Baskets: Planter baskets shall be fabricated of structural steel shapes, plates, and bars. Assembly shall be galvanized after assembly and finished per specifications. Planter bowls shall be heavy black plastic containers to tightly fit the basket assembly.

G. Outlet Mounting Plate: Provide galvanized steel outlet mounting plate located near the top of each lantern lighting pole as shown on the Drawings. The galvanized steel outlet mounting plate shall be cutout, drilled and tapped for installation of 1 duplex, GFI type receptacle outlet and weatherproof cover plate. Pole shall be drilled and tapped as indicated on the Drawings.

H. Assembly: Pre–assemble components at pole manufacturer's shop to the greatest extent possible, so as to minimize field splicing and assembly of units at the project site. Disassemble units only to the extent necessary to comply with shipping limitations. Mark units clearly for re–assembly and proper installation. Include required hardware for field assembling luminaires to poles.

I. Factory Finish Painting: Finish all metal surfaces of the lighting poles with a thermosetting, weathering, polyester powder coating system.

2.2 SOURCE QUALITY CONTROL

A. Pole Test: Comply with the following minimum requirements.

1. Test Load, Deflection and Set: 3600 lb. test load, 12" maximum deflection, and 1" maximum set.

2. Horizontal Load Test: The lantern light pole assembly, anchor plates, and bolts shall be tested with a horizontal load of 1,000 pounds applied at the topmost point of the pole.

B. Testing Banner Arm, Basket, and Traffic Signal Supports: 300 lb. load shall be applied to the ends of the arms for banners, baskets, and traffic signals at their respective center lines without deflection. The manufacturer shall supply wind loading calculations for the complete assembly with all attachments included.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine the areas to receive the Work and the conditions under which the Work would be performed. Contractor shall remedy conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Painting: Include the following pretreatment process and painting process on all exterior surfaces and on the interior base section of the pole to a minimum height of 12". Apply coatings after components are fabricated and welded and prior to mechanically assembling components.

1. Oil and Grease Removal: Wash metal surfaces with an alkaline detergent to remove oils and grease.

2. Cleaning: Clean exterior metal surfaces by blasting with a combination of shot and grit to remove dirt, mill scale, rust, corrosion, oxides and foreign matter, providing a "near white" surface in accordance with SSPC–SP10.

3. **Pretreatment:** Treat the cleaned metal surfaces with a hot, pressurized iron phosphate wash and dry using convection heat.

4. **Finish Coat:** Apply the polyester powder coat electrostatically to all cleaned and treated surfaces to a uniform 8 mil thickness in a one–coat application. Cure the powder coat in a convection oven at a 400ºF minimum temperature to form a high molecular weight fusion bonded finish.

5. **Alternate Methods:** Alternate powder coat methods may be reviewed and tested on a case by case basis. However, no alternate coating method will be used unless the Commissioner determines that the alternate is equal to the specified coating system.

6. **Interior Coat of Steel Pole:** Powder coat the street pole interior metal surfaces with a thermoplastic hydrocarbon resin containing application over untreated metal surfaces. Apply the resin at approximately 200ºF temperature to a minimum 3 mil thickness. Overlap the interior thermosetting base coat with the interior thermoplastic coat by approximately 6". Alternate interior coatings may be used subject to the Commissioner's prior approval.

7. **Durability:** Both the exterior and interior coats shall pass 1,000 hours of salt spray exposure per ASTM B117 in a 5% Na Cl (by weight) solution at 95ºF and 95% relative humidity without blistering. Before testing, scribe the panel with an "X" down to bare metal.

8. **Coating Measurement:** Measure coating thickness in accordance with SSPC–PA 2–73T, "Measurement of Dry Paint Thickness with Magnetic Gauges", except that the lowest "single spot measurement" in an area of two square inches shall be not less than 7.0 mils.

9. **Color:** Gloss black color, unless otherwise indicated. Submit color sample for approval prior to fabrication. This color sample shall include the manufacturer's name and the manufacturer's color name as well as any other information required to purchase the same color for the arms, luminaires and cast aluminum split pedestal base.

10. **Field Touch–up:** Furnish a field touch–up kit for every 20 poles or fraction thereof, consisting of a highly legible instruction sheet, one gallon of the recommended touch–up paint and all other materials required to touch–up 20 light poles.

END OF SECTION